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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/549,817

09/19/2005

Richard Michael Jenkins

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06/06/2007

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EXAMINER

BLEVINS, JERRY M

ART UNIT

PAPER NUMBER

2883

MAIL DATE

DELIVERY MODE

06/06/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/549,817

Applicant(s)

JENKINS ET AL.

Examiner

Jerry Martin Blevins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,12-17,19,21-25,27 and 30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,12-17,19,21-25,27 and 30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2005 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments, see page 7, filed March 9, 2007, with respect to claim 27 have been fully considered and are persuasive. The objection of claim 27 has been withdrawn.

Applicant's arguments filed March 9, 2007 have been fully considered but they are not persuasive. First, examiner contends that applicant's allegation that the applied reference, US 6,219,470 to Tu, merely teaches a demultiplexer and not a multiplexer/demultiplexer device is incorrect. Throughout the text, Tu teaches both multiplexing and demultiplexing, as most distinctly shown in the abstract, in column 1, lines 5-13, and in column 2, lines 35-40. Second, examiner contends that half-mirror 304 serves as a filter, as this element permits certain wavelengths to pass through and reflects others, thus filtering based on wavelength. Therefore, Tu does teach a plurality of wavelength filters, 303 and 304. Third, as seen in Figure 3, Tu teaches that light is guided from waveguides 312 between filters 303 and 304, as light clearly propagates from the waveguides, located on the right side of filter 303, through filter 303, through filter 304, and eventually to element 307, located on the left side of filter 304. The claimed invention does not require that the waveguides are physically located between the filters but only that light is guided between the filters using the waveguides. Finally, applicant has given no justification for the allegation that the invention of Tu provides a

temperature insensitive device. Therefore, examiner maintains that the explicit teaching of the applied reference to Miura, "Modeling and Fabrication of Hollow Optical Waveguide for Photonic Integrated Circuits", that the use of hollow waveguides provide temperature insensitivity serves as adequate motivation for combining the invention of Tu with the hollow waveguides of Miura.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 12-14, 17, 19, 22, 23, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu in view of Miura.

Regarding claim 1, Tu teaches an optical wavelength division multiplexer/demultiplexer device (Fig. 3) comprising a substrate (301) having a plurality of wavelength selecting filters (303, 304, 305), the filters being arranged to provide conversion between a combined beam comprising a plurality of wavelength channels and a plurality of separate beams each comprising a subset of the plurality of wavelength channels (column 3, line 45 – column 4, line 3). Tu also teaches waveguides (312) formed in the substrate to guide light between the wavelength filters. Tu does not teach that the waveguides have hollow cores. Miura teaches hollow core waveguides formed in a substrate to guide light between wavelength filters of a

multiplexer/demultiplexer device (pages 4785-4879). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the hollow core waveguides of Miura in the device of Tu. The motivation would have been increase temperature insensitivity (Miura, page 4785).

Regarding claim 2, Tu teaches that the plurality of wavelength selecting filters transmit a single wavelength channel (column 3, line 45 – column 4, line 3).

Regarding claim 3, Tu teaches that the wavelength selecting filters comprise thin film optical filters (column 3, line 45 – column 4).

Regarding claim 4, Tu teaches a plurality of alignment slots (302) arranged to receive, in alignment, the optical filters.

Regarding claim 5, Tu in view of Miura renders obvious the limitations of the base claim 4. Tu does not teach MEMS structures to provide the alignment. Miura teaches MEMS structures that provide alignment (pages 4875-4879). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the MEMS structures of Miura in the device of Tu. The motivation would have been to increase the functionality of the device (Miura, page 4875).

Regarding claim 6, Tu teaches that the substrate comprises silicon (column 3, line 45 – column 4, line 3).

Regarding claim 12, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu does not teach that a base portion and a lid portion define the hollow core waveguide. Miura teaches a hollow core waveguide defined by a base portion and a lid portion (Fig. 1). It would have been obvious to one of ordinary skill in the art at the

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time of the invention to include the lid and base of Miura in the device of Tu. The motivation would have been to improve the confinement of light within the waveguide.

Regarding claim 13, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu also teaches a further waveguide (307) provided in the substrate to guide the combined beam and/or the plurality of separate beams each comprising a subset of the plurality of wavelength channels to/from the plurality of wavelength selecting filters. Tu does not teach that the waveguide has a hollow core. Miura teaches hollow core waveguides formed in a substrate to guide light between wavelength filters of a multiplexer/demultiplexer device (pages 4785-4879). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the hollow core waveguide of Miura in the device of Tu. The motivation would have been increase temperature insensitivity (Miura, page 4785).

Regarding claim 14, Tu teaches a alignment slots (302) arranged to receive, in alignment, an optical fiber, thereby enabling light to be coupled between the optical fiber and the at least one further waveguide.

Regarding claim 17, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu does not teach that the hollow core waveguide comprises a reflective element. Miura teaches a hollow core waveguide with a reflective element (Fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the reflective material of Miura in the device of Tu. The motivation would have been to improve the confinement of light within the waveguide.

Regarding claim 19, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu does not teach that the hollow core waveguides are dimensioned to support fundamental mode propagation. Miura teaches fundamental mode propagation in a hollow core waveguide (pages 4786, 4787). It would have been obvious to one of ordinary skill in the art at the time of the invention to dimension the waveguides of Tu such as to support fundamental mode propagation, as taught by Miura. The motivation would have been to increase the functionality of the multiplexing capabilities.

Regarding claim 22, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu does not teach that the hollow core waveguides have a substantially rectangular cross section. Miura teaches hollow core waveguides with a substantially rectangular cross section (Fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the substantially rectangular waveguide of Miura in the device of Tu. The motivation would have been to improve alignment with the substantially rectangular device of Tu (Fig. 3).

Regarding claim 23, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu does not teach at least three wavelength channels. Miura teaches a wavelength division multiplexing device comprising at least three wavelength channels (page 4786). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the at least three wavelength channels of Miura in the device of Tu. The motivation would have been to increase the functionality of the multiplexing capabilities.

Regarding claim 30, Tu teaches a substrate (301) for an optical wavelength multiplexer/demultiplexer device (Fig. 3) comprising a plurality of alignment slots (302) for receiving a plurality of wavelength selecting filters (303, 304, 305) and waveguides (312) to guide light between the alignment slots wherein the arrangement provides, when appropriate wavelength selecting filters are located in the alignment slots, conversion between a combined beam comprising a plurality of wavelength channels and a plurality of beams comprising a single wavelength channel (column 3, line 45 – column 4, line 3). Tu does not teach that the waveguides have hollow cores. Miura teaches hollow core waveguides formed in a substrate to guide light between wavelength filters of a multiplexer/demultiplexer device (pages 4785-4879). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the hollow core waveguides of Miura in the device of Tu. The motivation would have been increase temperature insensitivity (Miura, page 4785).

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu in view of Miura as applied to claim 14 above, and further in view of US 6,101,210 to Bestwick et al.

Regarding claims 15 and 16, Tu in view of Miura renders obvious the limitations of the base claim 14. Tu does not teach a mode matcher. Bestwick teaches a ball lens mode matcher (column 2, lines 9-16). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the ball lens mode matcher of

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Bestwick in the device of Tu. The motivation would have been to improve coupling between the fiber and the waveguide (Bestwick, column 2, lines 9-16).

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tu in view of Miura as applied to claim 1 above, and further in view of US 2002/0191907 to Kinoshita et al.

Regarding claim 21, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu does not teach that the hollow core waveguides are dimensioned to support multi-mode propagation. Miura teaches multimode propagation in the hollow core waveguides (page 4876). It would have been obvious to one of ordinary skill in the art at the time of the invention to dimension the waveguides of Tu so that they propagate multi-mode signals, as taught by Miura. The motivation would have been to increase the functionality of the multiplexing capabilities. Tu also does not teach that the wavelength selecting filters are spaced apart by the re-imaging distance. Kinoshita teaches wavelength selecting filters spaced apart by the re-imaging distance (paragraphs 66 and 67). It would have been obvious to one of ordinary skill in the art at the time of the invention to space the filters of Tu by the re-imaging distance, as taught by Kinoshita. The motivation would have been to enhance proper interference between wavelength modes (Kinoshita, abstract).

Claims 24, 25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu in view of Miura as applied to claim 1 above, and further in view of US 6,097,517 to Okayama.

Regarding claims 24, 25, and 27, Tu in view of Miura renders obvious the limitations of the base claim 1. Tu also teaches that the device is arranged to receive a combined beam comprising a plurality of wavelength channels and to separate the combined beam into a plurality of beams each comprising a subset of the plurality of wavelength channels, and that the device is arranged to receive a plurality of beams each comprising a subset of the plurality of wavelength channels and to combine the plurality of beams to produce a combined beam comprising a plurality of wavelength channels (column 3, line 45 – column 4, line 3). Tu does not teach that one of a plurality of beams produced by a demultiplexer stage are routed to a multiplexer stage via an optical processor. Okayama teaches beams routed to a multiplexer stage via a matrix switch processor, wherein the matrix switch receives an additional wavelength channel, and the matrix switch is arranged to route at least one additional wavelength channel to the multiplexer stage (column 4, line 58 – column 5, line 12 and column 8, lines 37-57). It would have been obvious to one of ordinary skill in the art at the time of the invention to rout the beams of Tu to a multiplexer stage via an optical processor, as taught by Okayama. The motivation would have been to reduce the size of the device (Okayama, column 4, line 58 – column 5, lie 12).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry Martin Blevins whose telephone number is 571-272-8581. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMB



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